## REMARKS/ARGUMENTS

Claim 1 is objected to for including an informality. The Examiner suggests that the phrase "the data element" in line 8 be amended to recite "the ATM cell". Claim 1 has been amended to recite "said ATM cell".

Claim 24 is objected to for including an informality. The Examiner suggests that the phrase "the second data element" in line 12 be amended to recite "the MPLS packet". Claim 24 has been amended to recite "said MPLS frame".

Claim 25 is objected to for including an informality. The Examiner suggests that the phrase "the second data element" in line 14 be amended to recite "the MPLS packet". Claim 25 has been amended to recite "said MPLS frame".

Claims 1, 10-12, 19, 22-25, and 36 stand rejected under 35 U.S.C. 103(a) as being unpatentable over United States Patent Application Publication No. 2003/0039246 by Guo, et al. ("Guo") in view of United States Patent Application Publication No. 2003/0169751 by Pulkka, et al. ("Pulkka"). In addition, Claims 28-29 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Guo. Furthermore, Claims 30-31 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Guo in view of Pulkka. Moreover, Claim 32-33 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Guo in view of Pulkka and further in view of United States Patent Application Publication No. 2002/0093980 by Trebes, Jr. ("Trebes").

The Examiner has objected to Claims 34-35 as being dependent upon a rejected base claim, but would allow these claims if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The Applicant thanks the Examiner accordingly.

Note that in rejecting Claims 25, 36, and 28 on pages 6, 8, and 10, respectively, of the Office Action the Examiner mentions "Chen". The Applicant assumes that the reference to Chen should have been to Guo.

Claims 1, 10-12, 19, 22-25, and 28-36 have been amended with a view to better defining the invention. No new matter has been entered by these amendments. Consequently, the Examiner is respectfully requested to consider amended claims in view of the following comments.

For reference, amended Claim 1 recites the following:

1. (Currently Amended) A method for translating at least one ATM quality of service (QoS) parameter related to an ATM transmission protocol from said ATM transmission protocol to a MPLS transmission protocol for an ATM cell being sent on a connection from an ATM communication network utilizing said ATM transmission protocol to a MPLS communication network utilizing said MPLS transmission protocol, said method comprising:

mapping said at least one ATM QoS parameter to a MPLS class of service value for said connection;

mapping said MPLS class of service value and a drop precedence value of said ATM cell to an experimental field value for indicating a MPLS quality of service provisioning;

converting said ATM cell to a MPLS frame; and,

incorporating said experimental field value into said MPLS frame for transmission through the MPLS network;

wherein:

said at least one ATM QoS parameter includes at least one of an ATM service category, a cell loss ratio, and a cell delay variation;

said experimental field value indicates drop precedence for said MPLS frame in addition to said MPLS class of service value; and,

said MPLS class of service value is one of a number of MPLS class of service values, said drop precedence value is one of first and second drop precedence values, said experimental field value is one of a number of experimental field values, and each of said MPLS class of service values is assigned first and second experimental field values selected from said number of experimental field values, said first and second experimental field values being associated with said first and second drop precedence values, respectively.

The Examiner has cited Guo against previous Claim 1. In particular, on pages 4-5 of the Office Action the Examiner states:

"Regarding claims 1 and 12, Guo discloses a method of translating at least one quality of service (QoS) parameter (the many QoS parameters/requirements of traffic carried in the 3G-RAN described in paragraph 40 on page 4 of Guo) related to a first transmission protocol (the radio protocols used by the BSs and RNCs of figure 4) from said transmission protocol to a MPLS transmission protocol for a data element (radio network packets sent through the MPLS network 406) being sent on a connection from a communication network (radio network) to a MPLS communication network (MPLS switching network 406 of Figure 4) utilizing said MPLS transmission protocol, said method comprising: mapping said at least one QoS parameter (the many QoS parameters/requirements of traffic carried in the 3G-RAN described in paragraph 40 on page 4 of Guo) to a class of service value for said connection (the classes of services are the traffic classes of the radio network controller and/or base station – see lines 8-10 of paragraph 33 on page 3, for example; clearly the mapping between the QoS parameters of paragraph 40 occurs in order to quantify a number of traffic classes); mapping said class of service value and a drop procedure value of the data element to another parameter (the EXP field of the MPLS packet; see paragraph 34 of page 3 which clearly indicates that the EXP field value includes information on both the QoS class as well as the drop precedence; clearly, the drop precedence is used to determine the value to which the EXP field is to be set) indicating a quality of service provisioning for said MPLS transmission protocol (see paragraph 34 on page 3 as described above); converting said data element of said connection to a MPLS frame associated with said second MPLS transmission protocol (see lines 8-12 of paragraph 38 on page 4 of Guo); and incorporating said another parameter into said MPLS frame for transmission of said MPLS frame in the MPLS network with the second MPLS transmission protocol (again, see paragraph 34 on page 3 which indicates the use of the EXP field) wherein: said at least one QoS parameter further includes a priority rating (see lines 7-9 of paragraph 44 on page 4) for MPLS frame and at least one of service category, cell loss ratio and cell delay variation (the UMTS traffic classes of paragraph 40 on page 4 are the scheduling classes); said another parameter indicates drop precedence for said MPLS frame in said MPLS communication network (see paragraph 34 on page 3 which descries how the drop precedence is included in the EXP field); and said MPLS frame is provided to said MPLS network for transmission through, a

label switched path and said another parameter is inserted in an experimental field of said MPLS frame (see figures 4 and 5 as well as lines 8-12 of paragraph 38 on page 4 of Guo)."

For reference, the selections from Guo cited by the Examiner above are as follows (context and underlining added by the Applicant):

"**[0033]** The following description of MPLS network principles and operation is provided to understand the implementation of the present invention in the MPLS environment in a radio access network. The focus of QoS support in MPLS networks is scalability. This is achieved by flow aggregation that ensures individual end-to-end QoS guarantees without maintaining state information about individual flows on each segment of the path. This satisfies the requirement to provide differentiated QoS to multiple classes of traffic in the RAN. Diffserv mechanisms are good candidates to provide QoS within MPLS networks because services are based on a per-hop model and aggregate forwarding resources that are allocated in the LSRs for each service. Functions such as classification, marking and policing are only necessary at the edge LSRs, while core LSRs need only have PHB classification. There are two types of LSPs, the E-LSPs and the L-LSPs."

"**[0034]** The general operation of DiffServ in an E-LSPs based MPLS domain is analogous to DiffServ in a non-MPLS network in the sense that the Per-Hop Behavior of the packet is based entirely on the encoded EXP field. In other words, instead of setting/reading DiffServ code point from the TOS field in IP header, it is set/read from the EXP field in the MPLS header. The EXP field is only 3-bits long and therefore a single E-LSP can support only up to 8 QoS classes. The mapping from EXP field to PHB (i.e. to PSC and drop precedence) for a given such LSP, is either explicitly signaled at label set-up or in reliance on a pre-configured mapping. The signaling can also be used to make bandwidth reservations for the E-LSP. One drawback of E-LSPs is that it can support only 2 QoS classes in the ATM domain, because the QoS treatment can be coded only in the Cell Loss Priority (CLP) bit in the ATM header."

"**[0038]** Referring now to FIG. 4, in one embodiment of the present invention UTRAN transport is implemented using label switching in a network supporting MPLS. This is in contrast to the scheme in which the UTRAN transport is provided by normal IP packet

forwarding. In other words, 'paths' **400** are established to interconnect BS **402** and RNC **404**. Such 'paths' **400** in an MPLS network **406** are the label switched paths (LSPs). After the LSP setup, the packets carrying radio frames are labeled at the ingress of the network and forwarded along the path using label switching. The advantage of this concept is that it can support built-in QoS."

"**[0040]** For illustration purposes, the following describes the downlink direction (uplink works in a similar way). For each BS **402** at least one LSP **400** is set up for carrying the aggregated traffic of the BS **402**. In 3G-RAN the traffic of a BS **402** is likely to comprise multiple classes, with different transport requirements. An example of that is UMTS traffic classes, i.e. conversational, streaming, interactive and background. Another example is the transport channels on WCDMA air interface which support soft-handover (e.g. dedicated channels, or DCH), and those which do not support soft handover (e.g. some common channels, or CCH). Yet another example is the transport channels, which require closed-loop power control (e.g. Dedicated Channels, Downlink Shared Channels, or DSCH, and Common Packet Channel, or CPCH) and those which do not require closed-loop power control (e.g. Forward Access Channel, or FACH, and Random Access Channel, or RACH). The diverse QoS requirements of the applications themselves (such as real time or non real time) combined with the requirements imposed by advanced radio control functions (such as soft handover and power control in CDMA systems) means that the MPLS transport technology needs to provide differentiated quality of services to multiple classes of traffic."

"**[0044]** In another embodiment multiple LSPs (see paths **506, 508, 510** in FIG. 5) are set up to connect each BS to the RNC, each LSP carrying one class of traffic, i.e. LSPs are class-specific. At the ingress of the MPLS transport network, the packets are mapped onto different LSPs based on their traffic classes. QoS differentiation is not required within the LSPs. The LSPs for different traffic classes will be assigned different attributes, such as bandwidth, priority, adaptability and so on. This embodiment can be implemented based on the L-LSP scheme and allows finer granularity resource control than the one with single LSP per BS. It allocates bandwidth resources in the transport network on a per class basis."

Please consider the following additional selections from Guo:

"**[0001]** The present invention provides a transport scheme based on Internet protocol (IP) and multiprotocol label switching (MPLS) technology for third generation (3G) radio access networks (RAN). Label switched paths are established and managed for interconnecting base stations and radio network controllers."

"**[0011]** It is a drawback of prior art systems that these systems cannot handle the diverse QoS requirements of the applications themselves (such as real time or non real time) when combined with the requirements imposed by advanced radio control functions (such as soft handover and power control in CDMA systems). The prior art systems do not adequately provide the transport technologies that can provide differentiated quality of services to multiple classes of traffic. The transport bearers need to support a variety of QoS requirements (delay, jitter, packet loss, etc.) and traffic characteristics (streaming, bursty, etc.). Other transport requirements, which are not adequately provided by the prior art include efficiency (i.e. reduction in protocol overhead), in-sequence packet delivery and connection identification of the air interface channels. While ATM/AAL2 transport scheme can support QoS requirements in UTRAN, it requires deployment of ATM switches and other equipment in both BSs and RNCs. This may not be the preferred solution for many 3G operators, who have a strong interest in fast and reliable transport technology for 3G radio access networks, without having to deploy ATM equipment. While ATM/AAL2 transport scheme can support QoS requirements in UTRAN, it requires deployment of ATM switches and other equipment in both BSs and RNCs. This may not be the preferred solution for many 3G operators, who require fast and reliable transport technology for 3G radio access networks, without having to deploy ATM equipment."

"**[0035]** The L-LSPs are used when more than 8 QoS classes (or more than 2 QoS classes with ATM) have to be supported. With L-LSPs this is accomplished by establishing a separate LSP for each QoS class between two MPLS capable neighbor nodes. **In this approach the QoS treatment of the packet is not based only on the EXP field in the MPLS header (there is not an EXP-field with ATM nodes), but on incoming label plus some other information either in the MPLS header or in the data link layer header. For**

example, with ATM, the QoS class is coded in the VPI/VCI field plus in the CLP bit. In order for the receiving node to know which QoS class the received packet belongs to, this information has to be signaled between nodes. This is accomplished by using either LDP or RSVP. Thus, in addition to the label, the LDP/RSVP message has been extended to contain information of QoS treatment of the packet marked with a particular label. The receiving node has to store this information in order to guarantee proper treatment of the labeled packet."

"[0041] There are two approaches to provide differentiated QoS in an MPLS-based transport network for 3G-RANs (see FIG. 5). The first one is to use a single LSP 500 to connect each BS 502 to the RNC 504. Multiple classes of traffic of a BS 502 are carried within one LSP 500. QoS differentiation is provided by packet marking and per-hop behavior (PHB) forwarding based on the CoS field of the header. The second one is to use multiple LSPs 506, 508, 510 to connect each BS 502 to the RNC 504. Each LSP 506, 508, 510 carries one class of traffic, i.e. class-based LSPs. In order to meet the transport QoS requirements of 3G-RAN, one embodiment of the present invention implements constraint-based routing to compute routes for LSPs. As mentioned earlier, an LSP can be assigned one or more attributes, such as bandwidth, set-up priority, holding priority and so on. In the simplest case, constraint-based routing computes LSP paths subject to bandwidth constraints alone. The basic rule is that the paths are selected such that the sum of bandwidths of all the LSPs on a link is less than the maximum reservable bandwidth of that link."

"[0043] In one embodiment a single LSP (see path 500 in FIG. 5) is set up to connect each BS to the RNC. The aggregated traffic of a BS, including all the classes, is carried within one LSP. At the ingress LSR of the LSPs the CoS field of the MPLS header is marked based on the traffic classes. Packets are buffered and scheduled based on the CoS field of the header in all the routers along the LSP. This embodiment can be implemented based on the E-LSP scheme and allocates bandwidth resources in the transport network on a per BS basis. It requires fewer LSPs than the one with multiple LSPs for each BS. In addition, it offers more flexibility in inter-class resource sharing. Sharing the allocated bandwidth between different traffic classes within a BS can be based on the DiffServ policy implemented at the LSRs."

"[0053] FIG. 10 depicts an embodiment of the inventive method of providing differentiated QoS in an MPLS based transport network for 3G-RAN. In step 1000 single or multiple first label switching paths are established having at least one label switching router, the first label switching path connecting a base station to a radio network controller, the base station having a plurality of traffic classes of traffic. In step 1002 single or multiple second label switching paths are established having at least one label switching router, the second label switching path connecting the radio network controller to the base station, the radio network controller having a plurality of traffic classes of traffic. In step 1004 a CoS field of a MPLS header in marked at a label switch router at an ingress to a respective label switching path of the first and second label switching paths to identify respective traffic classes of traffic being carried by a respective one of the base station and radio network controller. In step 1006 the traffic within the respective label switching path is forwarded through the network based on the marked CoS field."

First, it is apparent from the above selections that Guo does not teach mapping both MPLS class of service and drop precedence (i.e., CLP) information to the MPLS experimental field as recited in amended Claim 1. That is, Guo does not teach a double or two stage mapping. In this respect, the Examiner is directed to paragraph 0035 of Guo (quoted above) which describes the problem that the Applicant's invention actually solves. Guo's singular mapping is apparent from paragraph 0053. Guo's method does not include drop precedence information in the experimental field.

Second, it is apparent from paragraph 0035 of Guo that Guo teaches away from the method of the Applicant's invention as recited in amended Claim 1. In particular, Guo describes an alternate method of relaying both MPLS class of service and drop precedence information that does not make sole use of the MPLS experimental field (i.e., by using the LDP or RSVP protocols).

Third, Guo pertains to IP packets and MPLS frames (see paragraph 0001 of Guo) rather than to ATM cells and MPLS frames. As such, Guo is not relevant to the subject matter recited in amended Claim 1.

As such, Guo does not teach or suggest those elements of amended Claim 1 that recite: "wherein:...said experimental field value indicates drop precedence for said MPLS frame in addition to said MPLS class of service value; and, said MPLS class of service value is one of a number of MPLS class of service values, said drop precedence value is one of first and second drop precedence values, said experimental field value is one of a number of experimental field values, and each of said MPLS class of service values is assigned first and second experimental field values selected from said number of experimental field values, said first and second experimental field values being associated with said first and second drop precedence values, respectively".

As such, the Applicant believes that amended Claim 1 is patentable over Guo as this reference does not teach or suggest the subject matter of amended Claim 1. In addition, the Applicant believes that Claims 10-11, being dependent on amended Claim 1 and adding patentable features thereto, are also patentable.

For the reasons given above with respect to amended Claim 1, the Applicant believes that amended Claim 12 is patentable. In addition, the Applicant believes that Claims 19 and 22-23, being dependent on amended Claim 12, and adding patentable features thereto, are also patentable.

For the reasons given above with respect to amended Claim 1, the Applicant believes that amended Claim 28 is patentable. In addition, the Applicant believes that Claims 29-35, being dependent on amended Claim 28, and adding patentable features thereto, are also patentable.

For the reasons given above with respect to amended Claim 1, the Applicant believes that amended Claims 24-25 and 36 are patentable.

No new matter has been entered by the above noted amendments.

The Applicant respectfully requests that a timely Notice of Allowance be issued in this case.

Respectfully submitted,

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Date: April 3, 2007

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